

REMARKS

Applicant has reviewed and considered the office action mailed on June 19, 2002 and the references cited therewith.

No claims are cancelled, claims 29 and 37 are amended, no claims are added, claims 38-40 were withdrawn from consideration by the Examiner; as a result, claims 2-5 and 21-37 are now pending in the application. The amendments to claims 29 and 37 were made to correct typographical errors and to clarify the subject matter of the claims. The amendments were not made in response to a rejection based on prior art.

§112 Rejection of the Claims

Claims 26-28, and 32-34 were rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The office action states: "The limitation that the tapered conductive segment comprises a hyperbolic taper, and the limitation that the tapered conductive segment includes an exponential taper are not described in the specification." Applicant respectfully disagrees. The specification, for example at page 5, lines 9-11, recites, "The taper is not limited to a linear taper. Other functions, such as hyperbolic functions and exponential functions, may be used to define the taper of the conductive segment 110." Thus, claims 26-28 and 32-34 are enabled in the specification. Therefore, applicant requests withdrawal of the rejections and reconsideration and allowance of claims 26-28 and 32-34.

Claims 2-5, and 21-37 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant traverses the rejections of claims 2-5 and 21-37.

Claims 2, 23, 29, and 35 were rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. Claims 2, 23, 29, and 35 recite, "vias coupled to the pad." The office action appears to reject the claims based on the use of the word "coupled." The Examiner's reference to MPEP 2172.01 in the rejection is unclear to

applicant because applicant does not believe that unclaimed essential matter is missing from claims 2, 23, 29, and 35 or that "coupled" fails to interrelate essential elements of the invention. If the Examiner applies this rejection in the next office action, applicant respectfully requests clarification as to how MPEP 2172.01 applies to the rejection. Applicant also respectfully submits that the Supreme Court held, in *Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45 (1923), that the use of "substantial" to describe an angle of pitch of a paper-making machine was sufficiently definite on the ground that those skilled in the art would know what was meant. Hence, those skilled in the art of interconnects would understand the meaning of "vias coupled to the pad" because "vias coupled to the pad" is clearly more definite than "substantial." Thus, the office action fails to state a *prima facie* case of indefiniteness with respect to claims 2, 23, 29, and 35. Therefore, applicant requests withdrawal of the rejections and reconsideration and allowance of claims 2, 23, 29, and 35.

The office action rejects claims 3, 4, 24, 26, 29, 30, 32, and 37 with further specificity. Applicant responds below to each specific rejection.

Claim 3 recites, "wherein at least one of the at least two vias is coupled to the pad by a conductive segment." The office action states that the limitation is not supported in the specification. Applicant respectfully submits that, if that is the case, then the proper rejection is a 35 U.S.C. 112, first paragraph, rejection rather than the present second paragraph rejection. Therefore, applicant requests withdrawal of the rejection and reconsideration and allowance of claim 3.

Claim 4 recites, "wherein only two of the three vias coupled to the substantially straight edges." The office action states that the limitation is not supported in the specification. Applicant respectfully submits that, if that is the case, then the proper rejection is a 35 U.S.C. 112, first paragraph, rejection rather than the present second paragraph rejection. Therefore, applicant requests withdrawal of the rejection and reconsideration and allowance of claim 4.

Claim 24 recites, "wherein at least three of the at least four vias is coupled to the pad by a tapered conductive segment." The office action states that "its [sic] further unclear if there is a possibility of the via substantially beneath the pad to be coupled to the pad by a tapered conductive segment." Applicant respectfully submits that the recited elements are sufficiently

definite because those skilled in the art of interconnects would understand the meaning of "wherein at least three of the at least four vias is coupled to the pad by a tapered conductive segment," when read in light of the specification. Hence, the office action fails to state a *prima facie* case of indefiniteness with respect to claim 24. Therefore applicant requests withdrawal of the rejection and reconsideration and allowance of claim 24.

Claim 26 recites, "wherein the tapered conductive segment comprises a hyperbolic taper." The office action states that "the limitation that the tapered conductive segment comprises a hyperbolic taper is vague and indefinite." Applicant respectfully submits that the recited elements are sufficiently definite because those skilled in the art of interconnects would understand the meaning of "wherein the tapered conductive segment comprises a hyperbolic taper" when read in light of the specification. Applicant respectfully submits that "a hyperbolic taper" refers, on its face, to the taper of "the tapered conductive segment." Hence, the office action fails to state a *prima facie* case of indefiniteness with respect to claim 26. Therefore applicant requests withdrawal of the rejection and reconsideration and allowance of claim 26.

Claim 29 is amended to correct a typographical error and to ensure a proper antecedent basis for all elements. Applicant requests withdrawal of the rejection and reconsideration and allowance of claim 29.

Claim 30 recites, "wherein at least three of the at least four vias is coupled to the pad by a conductive segment." The office action states that "its further unclear if there is a possibility of the via substantially beneath the pad to be coupled to the pad by a tapered conductive segment." Applicant respectfully submits that the recited elements are sufficiently definite because those skilled in the art of interconnects would understand the meaning of "wherein at least three of the at least four vias is coupled to the pad by a conductive segment," when read in light of the specification. Hence, the office action fails to state a *prima facie* case of indefiniteness with respect to claim 30. Therefore applicant requests withdrawal of the rejection and reconsideration and allowance of claim 30.

Claim 32 recites, "wherein the tapered conductive segment includes an exponential taper." The office action asserts that the recited element is vague and indefinite. Applicant respectfully submits that the recited elements are sufficiently definite because those skilled in the

art of interconnects would understand the meaning of "wherein the tapered conductive segment includes an exponential taper" when read in light of the specification. Hence, the office action fails to state a *prima facie* case of indefiniteness with respect to claim 32. Therefore applicant requests withdrawal of the rejection and reconsideration and allowance of claim 32.

Claim 37 is amended to correct a typographical error and to ensure a proper antecedent basis for all elements. Applicant requests withdrawal of the rejection and reconsideration and allowance of claim 37.

§102 and §103 Rejection of the Claims

Claim 2 is rejected under 35 U.S.C. § 102(e) as being anticipated by Memis (U.S. Patent No. 6,162, 997). Applicant traverses the rejection of claim 2.

Claim 2 recites, "at least two vias coupled to the pad." The office action states:

Memis teaches an interconnect comprising: a substrate (Reference numbers 12, 13, 14); a pad (Reference number 20) formed on the substrate; and at least two vias (Reference number 21, 26) coupled to the pad, wherein only one (Reference number 21) of the at least two vias is formed substantially beneath the pad.

However, applicant respectfully disagrees and submits that reference number 26 is not associated with a via. Memis, at column 2, line 16, recites, "plated through holes 26." A plated through hole is not a via. Hence, Memis does not teach "at least two vias," so Memis fails to teach each of the elements of claim 2. Thus, the office action fails to state a *prima facie* case of anticipation with respect to claim 2. Therefore, applicant requests withdrawal of the rejection and reconsideration and allowance of claim 2.

Claim 3 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis (U.S. Patent No. 6,162,997) in view of Badet, et al. (U.S. Patent No. 4,371,744). Claim 4 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis (U.S. Patent No. 6,162,997) in view of Goenka, et al. (U.S. Patent No. 4,371,744). Claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis (U.S. Patent No. 6,162,997) in view of Goenka, et al. (U.S. Patent No. 4,371,744), and further in view of Frei et al. (U.S. Patent No. 5,342,999). Claims 21-22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis (U.S.

Patent No. 6,162,997). Applicant traverses the rejections of claims 3-5 and 21-22.

Claims 3-5 and 21-22 are dependent on claim 1. Each of the rejections of claims 3-5 and 21-22 is premised on Memis teaching "at least two vias coupled to the pad." Applicant has explained above in the discussion of claim 1 why Memis does not teach "at least two vias coupled to the pad," so each of the rejections of claims 3-5 and 22-23 fails. Thus, the office action fails to state a *prima facie* case of obviousness with respect to claims 3-5 and 22-23. Therefore, applicant requests withdrawal of the rejections and reconsideration and allowance of claims 22-23.

Claims 23, 29, and 35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis (U.S. Patent No. 6,162,997). Applicant traverses the rejections of claims 23, 29, and 35.

Claims 23, 29, and 35 recite, "at least three vias," "at least four vias," and "at least five vias," respectively. The office action states:

Memis teaches an interconnect comprising: a substrate (Reference numbers 12, 13, 14); a pad (Reference number 20) formed on the substrate; and at least two vias (Reference number 21, 26) coupled to the pad, wherein only one (Reference number 21) of the at least two vias is formed substantially beneath the pad.

However, applicant respectfully submits that reference number 26 is not associated with a via. Memis, at column 2, line 16, recites, "plated through holes 26." A plated through hole is not a via. Hence, Memis does not teach "at least two vias." Thus, the argument set forth in the office action that three vias, four vias, and five vias are obvious in light of the teachings of Memis is flawed because Memis does not teach "at least two vias." Thus, the office action fails to state a *prima facie* case of obviousness with respect to claims 23, 29, and 35. Therefore, applicant requests withdrawal of the rejections and reconsideration and allowance of claims 23, 29, and 35.

Claims 24-25 and claims 30-31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis (U.S. Patent No. 6,162,997) in view of Frei et al. (U.S. Patent No. 5,342,999). Claims 26-27 and 32-33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis (U.S. Patent No. 6,162,997) in view of Frei et al. (U.S. Patent No. 5,342,999) and further in view of Sasaoka, et al. 6,010,769). Claim 28 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis (U.S. Patent No. 6,162,997) in view of Frei et

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al. (U.S. Patent No. 5,342,999) and further in view of Sasaoka, et al. (U.S. Patent No. 6,010,769) and Kondo, et al. (U.S. Patent No. 6,043,986). Claim 34 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis (U.S. Patent No. 6,162,997) in view of Frei, et al. (U.S. Patent No. 5,342,999) and further in view of Sasaoka et al. (U.S. Patent No. 6,010,769) and Manchi (U.S. Patent No. 3,601,750). Claim 36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis (U.S. Patent No. 6,162,997). Claim 37 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Memis (U.S. Patent No. 6,162,997) in view of Kondo, et al. (U.S. Patent No. 6,043,986). Applicant traverses the rejections of claims 24-28, 30-34, and 36-37.

Claims 24-38 are dependent on claim 38. Claims 30-34 are dependent on claim 29. Claims 36-37 are dependent on claim 35. Each of the rejections of claims 24-28, 30-34, and 36-37 is premised on Memis teaching "at least two vias" to support the rejections of claims 23, 29, and 35. However, applicant has explained above in the discussion of claim 1 why this premise is invalid. Hence, the rejections of claims 24-28, 30-34, and 36-37 are flawed. Thus, the office action fails to state a *prima facie* case of obviousness with respect to claims 24-28, 30-34, and 36-37. Therefore, applicant requests withdrawal of the rejections and reconsideration and allowance of claims 24-28, 30-34, and 36-37.

Even if the references teach or suggest the elements of a claims 3, 4, 5, 24-27, 28, 30-33, 34, 36, and 37, the office action must also provide specific, objective evidence of record for a finding of a suggestion or motivation to combine reference teachings and must explain the reasoning by which the evidence is deemed to support such a finding to establish a *prima facie* case of obviousness. *In re Sang Su Lee*, 277 F.3d 1338, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002). For each of the obviousness rejections based on a combination of references under 35 U.S.C. § 103(a), the office action states that the combination would have been obvious and lists reasons why the Examiner believes that the combination would have been obvious. However, the office action fails to provide specific, objective evidence of record to support a finding of a suggestion or motivation to combine reference teachings. The office action does provide the following chain of reasoning in an attempt to establish a suggestion or motivation to combine the references necessary to teach or suggest each of the elements of claim 34. To establish a suggestion or

motivation to combine the teachings of Memis and Frei, the office action states at page 9:

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Memis and Frei, in order to have at least three of the at least four vias coupled to the pad by using the Frei tapered conductive segments, thus effectively and reliably connecting the pad and the vias, without having to have a bigger pad, reducing the material used and in that way reducing the cost of manufacture.

The office action then takes official notice of the use of aluminum in claim 31 to make up for the fact that aluminum is missing from Memis and Frei.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the tapered conductive segment comprising aluminum, to have a good and lightweight conductive material as the material of the tapered conductive segment.

To justify combining the teachings of Memis, Frei, the official notice, and Sasaoka to teach each of the elements of claim 32, the office action states:

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Memis, Frei, and Sasaoka in order to make the tapered conductive segment comprising an exponential taper, thus improving the reliability of the connection by making the interconnect more resistant to stress applied during manufacturing.

The office action then takes official notice of the use of tungsten for the pad in claim 31 to make up for the fact that tungsten is not taught by Memis, Frei, or Sasaoka by stating:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the pad comprising tungsten, to have a highly conductive material as the pad that can resist high temperatures during manufacturing and operation.

Finally, to justify combining the teachings of Sasaoka, Memis, first official notice, Frei, and second official notice with Mancini to teach the elements of claim 34, the office action states:

It would have been obvious to one of ordinary skill in the art at the time the

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invention was made to combine the teachings of Memis, Frei, Sasaoka and Mancini in order to have each of the at least two vias comprising square conductors, in order to assure an uniform electrical conduction by having a uniform cross section.

The office action fails to connect these conclusory statements to the record. For example, it fails to connect, "It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the tapered conductive segment comprising aluminum, to have a good and lightweight conductive material as the material of the tapered conductive segment." Applicant is unaware of any responsible authority that justifies the use of aluminum for an interconnect because aluminum is a light weight material. Hence, the office action fails to meet the standard for finding a suggestion or motivation to combine references enunciated in *In re Sang Su Lee*. Thus, the office action fails to state a *prima facie* case of obviousness with respect to claims 3, 4, 5, 24-27, 28, 30-33, 34, 36, and 37.

The office action also states that official notice is being taken of several missing elements in claims 4, 21, 23, 25-26, 29, 31-33, 35 and 36. Applicant respectfully objects to the taking of official notice, and pursuant to M.P.E.P. § 2144.03, applicant traverses the assertions of official notice and respectfully requests that the Examiner cite a reference that teaches the missing elements. If the Examiner cannot cite a reference that teaches the missing element, applicant respectfully requests that the Examiner provide an affidavit that describes how the missing elements are present in the prior art. If the examiner cannot cite a reference or provide an affidavit, applicant requests withdrawal of the rejections and reconsideration and allowance of claims 4, 21, 23, 25-26, 29, 31-33, 35 and 36.

The office action also states that several claims were the result of mere design choices and therefore obvious. Applicant respectfully notes that the cases cited were not in the art of designing interconnects and are therefore inapplicable.

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Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at 612-371-2109 to facilitate prosecution of the application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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CERTIFICATE UNDER 37 C.F.R. 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Box AF, Commissioner of Patents, Washington, D.C. 20231, on this 21 day of October 2002.

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